

# Meta-Analysis of Dyslexia Indicators

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## Abstract

Developmental Dyslexia is a multifaceted neurobiological learning disorder that is characterized by a large array of symptoms that vary in severity from case-to-case. Primarily caused by phonological deficits, which has a significant effect on word level reading and spelling; though secondary deficits are also observed in reading comprehension, vocabulary, and background knowledge that could be traced to the foundational phonological deficit. With this study, our research question is how does the prevalence of the traits of dyslexia correlate with one another? This research is vital to provide an improved common understanding of the disorder, as well as identify deficits that correspond with one another for easier identification of developmental dyslexia in children for early intervention. Utilizing the program Covidence, a model-based meta-analysis will be done using research articles and dissertations sourced by PRISMA. Sorting through approximately 9,000 papers, screening first distinguished appropriate abstracts, then full text review was done. Currently 2155 studies are approved for data extraction to be used for the model-based meta-analysis, but due to how expansive this study is, results have yet to be established. Expected results are the correlations of the prevalence of dyslexia symptoms to one another. This study in the future will provide a clearer understanding of symptom correlation with developmental dyslexia, which in turn can improve the diagnosis of dyslexia, as well as reading intervention programs that aid in improvement in observed deficits.

## Introduction

- Developmental dyslexia affects decoding, word recognition, and spelling despite typical intelligence and instruction.
- Prior research has examined predictors such as:
  - Phonological awareness
  - Rapid naming
  - Attention
  - Reading fluency
- Findings are often inconsistent across studies.
- This project uses a model-based meta-analysis to identify the most reliable indicators of dyslexia.
- Studies were systematically collected, screened in Covidence, and selected using clear inclusion criteria.
- A comprehensive, high-quality dataset will strengthen conclusions about early identification and intervention.

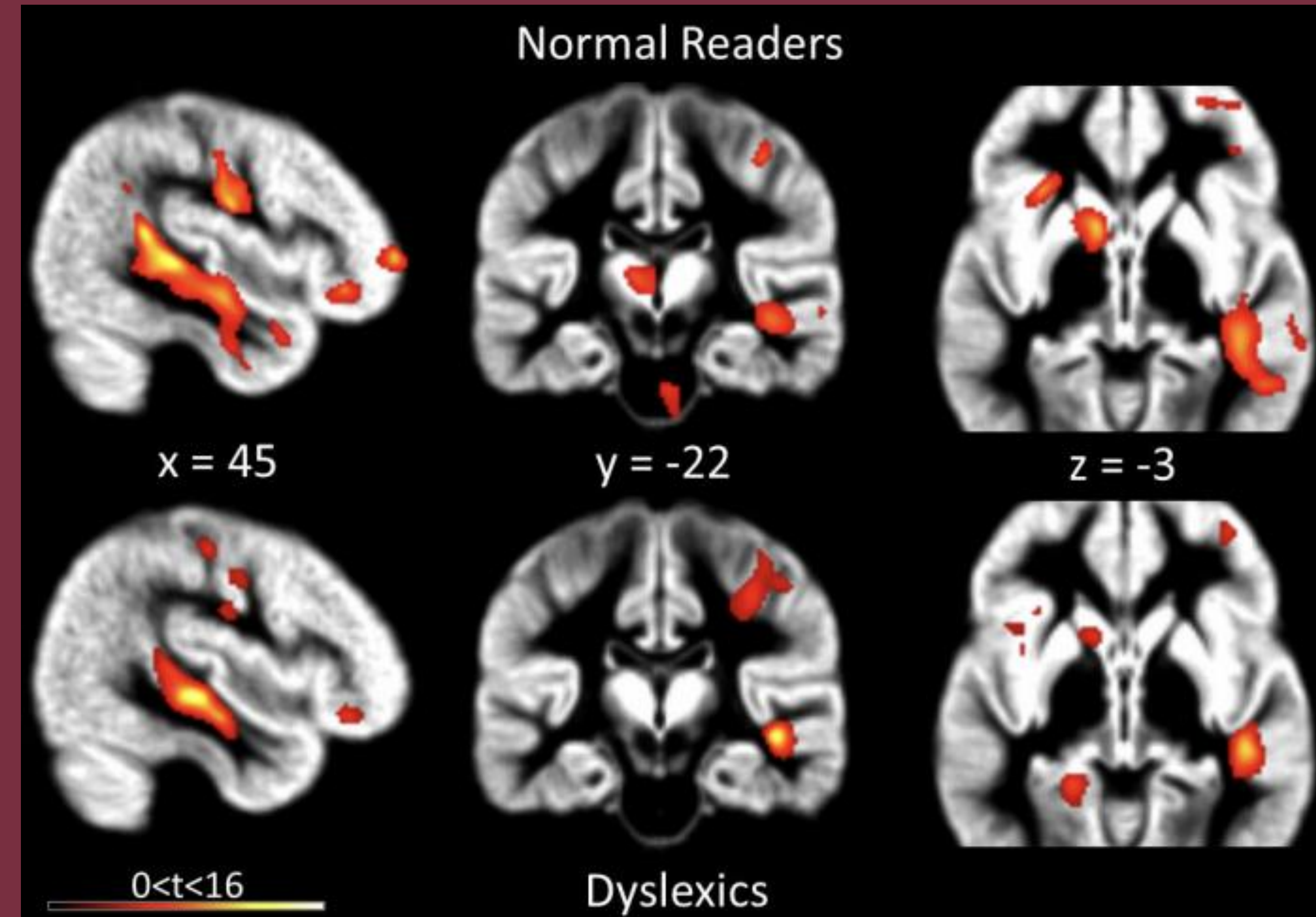


Figure 1: These images show distribution of gray matter asymmetry in cerebral regions of normal readers and dyslexic participants.

## Methods

- Researchers participated in the Meta-Analytic Structural Equation Model by completing full text screen reviewing of studies on dyslexia and reading disabilities, specifically predictors and correlations.
- The subject of this research is studies on dyslexia and reading disabilities, specifically indicators and correlations
- Researchers utilized the PRISM program on Covidence, a web-based software platform designed to streamline the management of systematic reviews and other literature reviews, to create a Meta-Analytic Structural Equation Model.
- The studies were screened and either included or excluded into the review summary based on a hierarchy of criteria:
  - 1) Language/Not a Study
  - 2) Population
  - 3) Target Measures/Subject
  - 4) Study Design
- The study began with texts being mass imported by the PRISM program on Covidence. They were sourced from APA PsycInfo, ERIC, Pubmed, and Dissertation & Theses Global using the search string shown in Figure 1.
- Although not done yet, the next expected step will be data extraction to prepare data to be utilized in the Meta-Analytic Structural Equation Modeling.

## Results

- Using a Meta-Analytic Structural Equation Modeling (MASEM) design, data is input to perform multivariable multiple regressions to determine the relationship and correlation between observed variables. It can also be applied to analyze unobservable, latent constructs that can influence tested variables.
- To answer our research question how does the prevalence of the traits of dyslexia correlate with one another, 9095 articles were screened for relevance to our study.
- Out of 9095 studies, 2548 failed to meet criteria standards and 916 have yet to be screened.

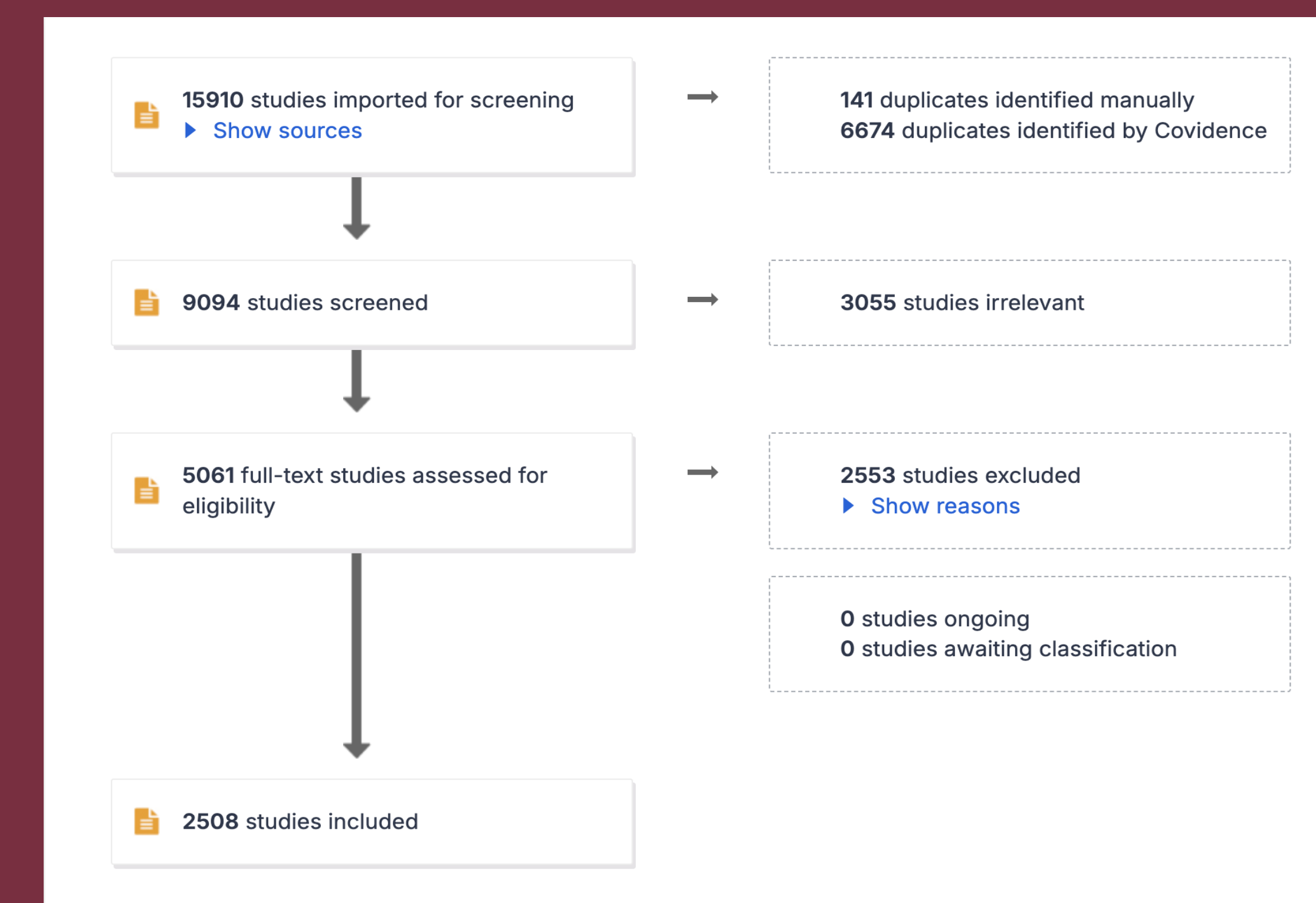


Figure 2: Describes the distribution of the search string results (journals, books, and dissertations/theses) through a Prisma graph

## Discussion

This project set out to answer a central question: how do the most commonly studied traits of developmental dyslexia relate to one another using a model-based meta-analytic approach? Although data analysis is still ongoing, the large-scale screening process has already shown that database selection meaningfully shapes the evidence base, influencing which measures and populations are represented. By using Meta-Analytic Structural Equation Modeling, this project moves beyond looking at single predictors and instead evaluates how multiple indicators interact together. A major strength of the study is its broad scope and structured screening process, while limitations include variability in how constructs are measured across studies and the restriction to English-language publications. Once finalized, the findings may help inform clearer risk assessment models and improve early identification and intervention practices for children with dyslexia.

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